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Report to the Chairman, Subcommittee on Commerce, Transportation, and Tourism, Committee on Energy and Commerce House of Representatives

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August 1986

HAZARDOUS WASTE

EPA's Superfund Program Improvements Result in Fewer Stopgap Cleanups

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Resources, Community, and
Economic Development Division

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August 15, 1986

The Honorable James J. Florio
Chairman, Subcommittee on Commerce,
Transportation, and Tourism
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

As requested in your September 6, 1985, letter and subsequent discussions, we have followed up on the extent the Environmental Protection Agency (EPA) has addressed the problems noted in our February 1985 report entitled, Clearer EPA Superfund Program Policies Should Improve Cleanup Efforts, (GAO/RCED-85-54). This report addresses the number and cost of repeat removal actions at National Priorities List sites, whether EPA is performing more thorough hazardous waste site clean ups, and whether EPA has changed its removal operating policies and procedures since our February 1985 report.

As arranged with your office, unless you publicly release its contents earlier, we will make this report available to other interested parties 30 days after the date of this letter. At that time, we will send copies to other appropriate congressional committees; the Administrator, EPA; the Director, Office of Management and Budget; the Chairman, Council on Environmental Quality; and other interested parties.

Sincerely yours,

Hugh J. Wessinger

Hugh J. Wessinger
Senior Associate Director

Executive Summary

Purpose

While the full extent of the nation's hazardous waste problem is unknown, estimates of potential hazardous waste sites range from 23,000 to 378,000. The Environmental Protection Agency (EPA) has already designated over 800 as the worst sites (called priority sites) and expects that list to grow to about 2,000. GAO reported in 1985 that EPA's actions to address immediate and significant hazards at priority sites resulted in the worst hazardous waste sites receiving only stopgap clean ups, leaving hazardous substances on the surface and requiring repeated stopgap actions at additional cost.

Concerned that EPA's cleanup practices may not have changed, the Chairman, Subcommittee on Commerce, Transportation, and Tourism, House Committee on Energy and Commerce, requested GAO to update its 1985 report. Specifically, GAO was asked to determine

- the number and cost of repeat actions at priority sites,
- whether EPA is now performing more thorough clean up actions, and
- whether EPA has changed its cleanup policies and procedures.

Background

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, commonly known as Superfund, authorizes EPA to clean up inactive hazardous waste sites whenever any hazardous substance, pollutant, or contaminant is released into the environment or a threat exists that it may be. EPA addresses these hazardous waste sites in two ways—(1) short-term efforts to abate or mitigate the immediate and significant threats, called removal actions and (2) longer term, more permanent, efforts called remedial actions.

EPA covered the costs of these responses through a $1.6 billion trust fund raised between 1981 and 1985 by taxes on designated chemicals and petroleum, but this taxing authority lapsed on September 30, 1985. The Congress is currently considering Superfund's reauthorization and may substantially increase the fund's size because of the magnitude of the problem.

In February 1985 GAO reported that from December 1980 (when Superfund became law) to February 1984, EPA finished removal actions at 72 priority hazardous waste sites. GAO recommended that EPA revise its regulations to require that removal actions eliminate surface hazards to the extent possible to reduce recurring threats, avoid repeated actions, minimize Superfund expenditures, and contribute to the permanent remedy of priority hazardous waste sites.

This report focuses on cleanup efforts at priority sites because EPA has responsibility for a permanent remedy at these sites. At nonpriority sites, EPA has responsibility for stabilizing or cleaning up immediate and significant threats. Any additional clean up is the responsibility of the state or responsible party.

Results in Brief

EPA has taken 43 repeat actions in the last 2 years. Most of these resulted from inadequate or incomplete removal actions during the first 3 years of the program—1981-83. Only seven repeat actions were taken at sites initially addressed since 1984, so EPA appears to be making progress in the use of removal actions. The most difficult problems are at the more complex sites involving such hazards as contaminated soils and lagoons.

Although EPA has modified its operating procedures and begun to perform more thorough short-term clean ups, it is still too early to determine the actual effectiveness of these actions because

- enough time may not have yet elapsed since the initial cleanup effort and
- cleanup activities have been delayed and curtailed due to funding limitations.

GAO Analysis

Repeat Actions Continue

Since the program's inception through 1985, EPA performed removal actions at 114 priority sites. While EPA considered each site stabilized after the removal actions, GAO found that 35 of these sites required 80 subsequent actions within a short period of time.

Most of these actions occurred at sites first addressed during the early years of the program. Of the 80 repeat actions, 73 took place at the priority sites EPA first addressed between December 1980 and February 1984. Only seven repeat actions were performed at the 42 sites initially addressed from February 1984 through December 1985.

For example, one site required six removal actions. EPA first conducted an emergency removal in February 1983 to pump down lagoons containing contaminated waters that were threatening to overflow due to

heavy rains. Two additional actions were needed to pump down and cap the lagoons. A fourth action was necessary to secure drums and fence the area. Finally, two additional actions were needed to repair the lagoons' cap and control soil erosion. The total cost was $781,000.

Repeat actions are costly. EPA has spent an estimated $54 million to stabilize priority sites. While GAO could not determine how much could be saved by performing more thorough initial actions, it identified costs of $22 million associated with repeat actions. Costs to clean up the spread of contamination, mobilize equipment, and develop plans for each action suggest that savings are possible.

EPA More Thoroughly Addressing Hazards

In early 1984 EPA began to more thoroughly clean up priority sites because of changes in management philosophy. Compared to GAO's previous report, EPA is performing more thorough short-term actions. EPA is removing more surface hazards such as drums and tanks, but continues to stabilize more difficult hazards like lagoons and soils as shown in table 1.

Table 1: Percent of Hazards Removed

Hazards	December 1980 February 1984	February 1984 December 1985
Drums	45	77
Tanks	23	70
Soils	44	36
Lagoons	17	32

The extent to which these changes will provide more complete clean ups is unknown because the lapse of Superfund taxing authority resulted in program disruptions. In March 1986 EPA identified 101 removal actions that had to be curtailed or delayed due to funding limitations.

EPA Modified Operating Policies and Procedures

Originally, EPA limited the use of the removal program to stabilizing actual or potential emergencies at priority sites to conserve resources. EPA recognized that this policy limited its ability to achieve more complete cleanups at these sites and has revised its policies and procedures.

These revisions, while lacking specific guidance as to the degree of clean up that must be undertaken, do provide the option to more thoroughly address hazards at priority sites.

Recommendations

GAO is not repeating the recommendation found in its earlier report because of pending legislation. While the Congress has not yet completed action on reauthorizing Superfund, the House and Senate Conference Committee agreed with the previous GAO recommendation and in June 1986 approved provisions containing language mandating that removal actions contribute to the efficient performance of any long-term remedial action. GAO believes that this legislative requirement, if enacted, will accomplish the same objective as the previous recommendation.

Agency Comments

GAO did not obtain official agency comments on this report. GAO did, however, discuss the contents of the report with EPA officials and has included their comments where appropriate.

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Abbreviations

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EPA	Environmental Protection Agency
GAO	General Accounting Office
NCP	National Contingency Plan
NPL	National Priorities List
PCB	polychlorinated biphenyl
RCED	Resources, Community, and Economic Development Division

Introduction

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980, commonly known as Superfund, authorizes the Environmental Protection Agency (EPA) to clean up inactive hazardous waste sites whenever any hazardous substance, pollutant, or contaminant is released into the environment or a threat exists that it may be. The costs of responding to such releases were covered by a trust fund of $1.6 billion raised between 1981 and 1985 by taxes on designated chemicals and petroleum and by appropriations. In addition, Superfund provided that the parties responsible for the conditions at the hazardous waste sites should either perform the clean up themselves or reimburse the fund for cleanups performed by the government.

Section 104 of the act provides for two basic types of cleanup actions—removals and remedials. Removal actions are short-term responses to address immediate and significant threats at any hazardous waste sites but are not necessarily final solutions. Removals are limited by the act to those actions that can be completed within 6 months and cost no more than $1 million. The act also provides that EPA can exceed these limitations on an exception basis. Remedial actions, on the other hand, are intended to provide a permanent remedy. The act provides that these actions shall not begin unless the affected state first agrees to certain assurances regarding cost sharing, future maintenance, and availability of disposal facilities. The act does not, however, designate the type of action that EPA should undertake in response to specific releases or threatened releases of hazardous substances.

Section 105 of the act required that EPA revise the National Contingency Plan (NCP) to incorporate Superfund's responsibilities and authorities, including methods and criteria for determining the appropriate extent of cleanup actions. This plan delineates federal and state response authorities for abandoned or uncontrolled hazardous waste sites. This section also requires that EPA develop a listing of the most hazardous waste sites that will become eligible for Superfund cleanup. This list, known as the National Priorities List (NPL), contained the names of 888 final and proposed priority hazardous waste sites as of June 1986, and EPA expects this list to grow to about 2,000 sites. EPA has designed a "hazard ranking system" to construct the NPL from an inventory of potential sites. This system assigns scores to such factors as the likelihood of contamination of groundwater, surface water, and air; the quantity and nature of hazardous wastes present; and the proximity of the site to population and sensitive natural environments.

EPA estimates that its inventory of potential sites contained nearly 25,000 sites as of May 1986. With a systematic discovery effort and a change in program emphasis, this inventory could dramatically increase the program's size to over 378,000 sites. Except for emergency actions, EPA limits its cleanup efforts to priority hazardous waste sites. At non-priority sites any additional clean up beyond removal actions is the responsibility of the state or responsible party.

Superfund Funding

Superfund's taxing authority expired at the end of fiscal year 1985, and at that time, EPA reported Superfund obligations amounting to $1.36 billion and outlays of about $897 million. The EPA Administrator reported that, excluding any stopgap funding reauthorization, the agency could at best have $180 million to $190 million available for fiscal year 1986 Superfund activities. EPA later revised this figure to about $239 million, which included about $189 million from fiscal year 1985 appropriations and up to $54 million to be received during fiscal year 1986 from cost recovery, residual taxes, and interest income. The estimated potential $243 million available for 1986 Superfund activities, however, fell far short of the planned fiscal year 1986 $900 million program authority. This shortfall in funds, coupled with the lapse of the taxing authority, resulted in a slowdown of Superfund activities from August 1985.

EPA, however, received interim funding when the President signed legislation on April 1, 1986, providing EPA with a $150 million advance from the general fund of the Treasury to the Hazardous Substance Response Trust Fund and required that none of the $150 million would be available for obligation after May 31, 1986. This $150 million in special Superfund appropriated funds allowed EPA to resume some of its cleanup activities.

Need to Perform More Thorough Cleanup Previously Identified

We previously reported that EPA should perform more thorough removal actions at the nation's priority hazardous waste sites. In our February 1985 report,[1] we found that the types and extent of removal actions taken varied in terms of cost, the kind of response required, and the degree of contribution to long-term site cleanup. Actions ranged from complete removal of hazardous substances from sites not on the NPL, to containing or stabilizing the hazards at priority sites for future remedial action. Unlike surface hazards, subsurface contamination problems

[1]Clearer EPA Superfund Program Policies Should Improve Cleanup Efforts (GAO/RCED-85-54, Feb. 6, 1985).

(such as groundwater contamination) are generally addressed under the remedial program because their solution requires more extensive study.

For our previous report, we reviewed the records of 165 hazardous waste sites with removal actions from program inception in December 1980 to February 1, 1984. Of these, 72 were priority sites. We focused on actions at the priority sites because additional federal clean up generally would be required. We found that some or all of the surface hazardous source remained onsite at many of these locations. As a result, of these 72 sites some required 1 to 4 recurring actions per site for a total of 37 repeat actions.[2]

Based on this analysis, we concluded that EPA's immediate removal actions should be required to attain more surface clean up when performed at priority sites to eliminate the health hazard earlier and also save money often spent on repeated temporary actions. We recommended that the EPA Administrator include in EPA's revisions to the NCP a requirement that removal actions eliminate surface hazards to the extent possible to reduce recurring threats, avoid repeated actions, minimize Superfund expenditures, and contribute to the permanent remedy of priority hazardous waste sites.

Objectives, Scope, and Methodology

On September 6, 1985, and in subsequent meetings, the Chairman, Subcommittee on Commerce, Transportation, and Tourism, House Committee on Energy and Commerce, requested that we follow up on the extent EPA has addressed the problems noted in our February 1985 report.

Specifically, the Chairman requested that we determine

- the number and cost of repeat actions at priority sites,
- whether EPA is performing more thorough cleanups at priority hazardous waste sites, and
- whether EPA has changed its removal operating policies and procedures since our February 1985 report.

To determine the number and cost of repeat actions at priority sites and whether EPA performed more thorough cleanups at hazardous waste sites, we reviewed EPA headquarters files on closed removal actions at

[2]Our earlier report discussed repeat actions at the 20 sites with only surface hazards which required 34 repeat actions rather than the 37 actions identified here which relate to the 72 priority sites.

285 sites and ongoing removal actions at 78 sites performed between February 1, 1984 (the cut-off point for our earlier report) and December 31, 1985. We obtained information on these cases, including the location of the site; whether the site was an NPL or non-NPL site; whether the action was a restart of a previous removal action; the costs incurred for the removal action; the type incident, hazard, and contamination before and after the removal action; whether EPA, the state, or a responsible party disposed of the hazardous substance offsite or provided for other onsite destruction; and made a determination as to whether additional surface clean up, subsurface clean up, or both were required even after the removal action occurred. To supplement the information in the EPA files or to obtain missing data required for our analysis, we contacted the responsible EPA Regional Coordinator or On-Scene-Coordinator. Additionally, we followed up on the number of subsequent removal actions that took place at the 72 NPL sites discussed in our February 1985 report.

To determine whether EPA revised its regulations to address the above issues, we reviewed the NCP, spoke to EPA officials responsible for drafting the revision, and reviewed policies and procedures relating to the removal program that have been created or revised since our report to determine whether these changes incorporated the essence of our recommendations.

Our audit work was conducted from October 1985 through June 1986 at EPA headquarters in Washington, D.C. The views of directly responsible agency officials were sought during the course of our work and are incorporated where appropriate. We did not obtain official comments on a draft of this report. Our review was performed in accordance with generally accepted auditing standards except as stated above.

Repeat Actions Continue at the Nation's Hazardous Waste Sites

EPA, in implementing the Superfund program, previously limited removal actions to preventing or mitigating immediate and significant risks of harm to human health, welfare, or the environment, so that removal actions would not use an inordinate share of the Superfund budget on less significant, non-NPL sites. The determination of immediate and significant risk is a subjective matter because NPL sites are eventually scheduled for long-term remedial action. Therefore, removal actions at NPL sites were usually of a short-term or stopgap nature, stabilizing hazardous waste threats until the remedial program could provide permanent, long-term cleanup solutions. Consequently, removal actions did not remove all hazardous substances located on the NPL site's surface, which resulted in recurring releases of wastes and continued threats to the public and environment. These hazardous substances often necessitated repeated, costly, clean up.

While EPA recently needed to take fewer repeat actions at newly addressed sites, most of the repeat actions undertaken in the last 2 years at priority sites resulted from inadequate or incomplete removal actions during the first 3 years of the Superfund program.

Removal Actions Provide Differing Degrees of Cleanup

The degree of EPA's removal actions varies from complete offsite removal of the hazardous substances to merely fencing the site to prevent public access. Additional actions generally involved removing drums, barrels, or tanks; draining ponds and lagoons; treating contaminated liquids and sludge; and containing or stabilizing the hazardous substances onsite to temporarily prevent future releases. A common action is to partially drain lagoons or raise lagoon walls to prevent overflow. Other contamination sources were capped with a layer of clay to prevent rainfall from carrying hazardous wastes off site or into groundwater. Drums were placed in larger containers called overpacks and/or secured in holding areas on specially prepared pads. Tanks were surrounded by dikes to capture leaked materials, and runoff controls were installed to prevent rainwater from washing contamination offsite or exposing buried wastes. Most removal actions used a combination of these response activities and in each action, EPA considered the techniques to have abated or mitigated the threats that precipitated the removal.

Historically, EPA more thoroughly cleaned up hazardous substances at sites not on the NPL because it did not envision requiring the longer term remedial action, while at the priority sites hazardous substances were contained or temporarily stabilized without the source contamination

being removed. Between December 10, 1980, the date of Superfund's enactment, and December 31, 1985, EPA completed removal actions at 114 priority sites and 314 nonpriority sites[1] with varying degrees of cleanup. Table 2.1 identifies the differing degrees of clean up during the time frame of the Superfund program.

Table 2.1: Extent of Clean Up During Superfund Removal Actions—December 1980 to December 1985

Type of site	No additional clean up required	Additional clean up required	Total[a]
NPL			
12/80 - 1/84	0	72	72
2/84 - 12/85	18	24	42
Total	**18**	**96**	**114**
Percent	16	84	100
Non-NPL			
12/80 - 1/84	67	26	93
2/84 - 12/85	179	42	221
Total	**246**	**68**	**314**
Percent	78	22	100
Total	**264**	**164**	**428**
Percent	62	38	100

[a]At December 31, 1985, EPA's ongoing removal actions included 27 NPL sites that involved 5 repeat removal actions and 51 non-NPL sites that are not included in this table. Since these 78 sites remained incomplete as of December 31, 1985, we could not assess the extent EPA would clean up these sites and potentially how many could result in future repeats because hazardous substances remained onsite after the removal action.

Since EPA's responsibility for cleaning up non-NPL sites ends with the mitigation of the threat (usually completion of the removal action), the remainder of this chapter addresses only EPA's actions at NPL sites where EPA is responsible for permanent site clean up.

Overview of EPA's Removal Efforts

At the 114 priority sites addressed since December 1980, EPA needed an additional 80 followup actions at 35 sites. Of these 80 repeat actions, 37 occurred during our earlier review and 43 occurred between February 1984 and December 1985. However, as shown in table 2.2, most of these

[1]Because of the manner in which EPA maintains its records, some sites may be identified on source documents as nonpriority even after the date the site officially becomes part of the National Priorities List and the actual closing date may not be reflected on these source documents until several months later. Therefore, our review of EPA's actions did not include closed actions at two priority and three nonpriority sites because they were listed as active at our cut off date.

repeat actions were taken on sites that had received its first removal before February 1984. This resulted from the inadequate or incomplete removal actions taken during the first 3 years of the program.

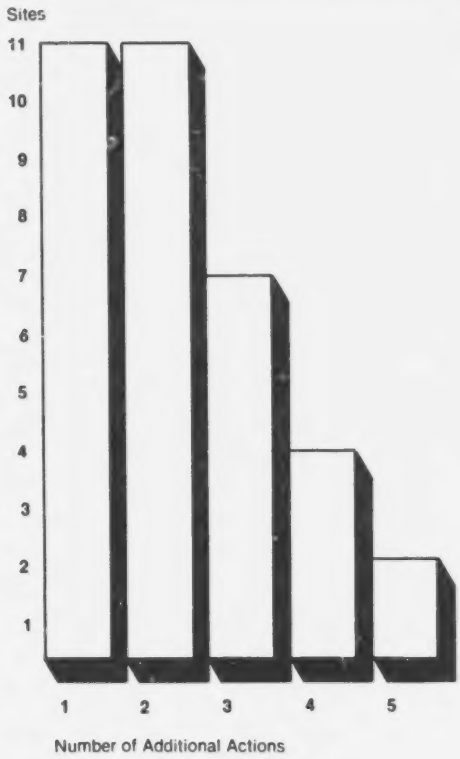
Table 2.2: Comparison of EPA's Removal Efforts— December 1980 to December 1985

	Initial removal action completed		
	12/80 to 1/84	2/84 to 12/85	Total
Number of NPL sites	72	42	114
NPL sites with repeats	30	5	35
Number of additional actions[a]	73	7	80
Average cost per NPL site removal	$332,274	$191,958	$294,982

[a]The original 72 sites included 4 sites with subsequent actions completed through April 1986 that are included in this and subsequent tables

Some of the 114 priority sites have required as many as five repeated actions to stabilize the threat as shown by chart 2.1.

Chart 2.1: Frequency of Repeat Actions at National Priorities List Sites



While EPA considered each site stabilized after the removal, we found that sites frequently require subsequent actions within a short time frame. Generally, the average time between the initial removal action and subsequent repeat actions has been about 8.8 months. Yet, most of the repeated actions occurred more rapidly as shown on table 2.3.

Table 2.3: Frequency of Repeat Actions Required

Time frame	Number of actions	Percent
Less than 6 months	37	46
6 to 12 months	24	30
13 to 24 months	14	18
25 months or more	5	6

Repeated Actions Continue at Previously Reviewed NPL Sites

Because EPA's initial actions at the 72 sites we originally reviewed did not completely mitigate the hazardous threats, repeat actions were required to stabilize these locations. Our 1985 report focused on removal actions taken at 72 NPL sites between December 1980 and February 1, 1984. Because some or all of the hazardous sources remained onsite at these 72 sites, they required 37 subsequent removal actions prior to February 1984.

As a follow-up, we reviewed the case files for those 72 sites and found that repeat actions continue to be necessary. From February 1, 1984 to December 31, 1985, these sites required 36 additional removal actions.

Of the original 72 sites assessed, 2 sites have had as many as six removal actions and still had hazardous sources remaining after the latest removal action. These sites serve to demonstrate the varying degrees of EPA removal actions.

Bridgeport Rental & Oil (New Jersey)—The site was an abandoned oil reclaimer, and its most predominant feature was a 12-acre oily waste lagoon containing residual oil and chemicals, including polychlorinated biphenyls (PCB's) in the oil layer. The lagoon was approximately 50 feet deep and contained in excess of 60 million gallons of oil and water and perhaps 25 million gallons of sludge. In April 1981 the Coast Guard performed the first removal action with Clean Water Act moneys and constructed a dike to provide what was considered to be reliable containment during the remedial investigation and feasibility work. However, in June 1982, only 9 months after the completion of the Coast Guard efforts, EPA undertook a removal action at a cost of $125,000 to

lower the level of the waste lagoon to prevent overflow. Then, in March 1983, an additional removal was approved for $35,000 to install activated carbon filtration units in up to 10 households where wells had been contaminated. Another action, costing $1,660,995, began in August 1983 to construct a fence, lower the lagoon, and to treat the discharge. In February 1984 EPA performed another removal action at a cost of $20,784 to repair a seep in the lagoon wall and to replace the filters. The case was reopened once again on November 9, 1984, because about 50 gallons of PCB-contaminated oil spilled. The oil was then drummed and left on site awaiting the proposed remedial action. Total cost, approximately $1.8 million.

American Creosote (Florida)—The site was a wood preserving plant using creosote and pentachlorophenol until 1981. During the years of operation, waste waters generated at the plant were discharged into two onsite ponds. Whenever pond levels became too high, the waste water was drawn off the pond and spread on designated areas of the property where it either evaporated or percolated into the ground. EPA conducted an emergency removal action in February 1983 to pump out the two largest lagoons containing contaminated waters that were threatening to overflow due to heavy rains and to reinforce the walls of the lower pond. This action, however, did not stabilize the site as another pumping operation was needed in April 1983. In September 1983, 1.6 million gallons of lagoon wastes were treated and discharged, sludge was consolidated, and a clay cap installed. EPA considered the water treatment and sludge consolidation complete; yet, in July 1984, another restart was approved to secure drums on a concrete pad and construct a fence around the pad. In November 1985 additional site work was authorized to repair the capped area that had been damaged by a hurricane. Soil and seeding was provided to prevent erosion, but then in April 1986 another removal action was approved to once again provide additional soil and reseeding. Total cost, approximately $781,000.

Fewer Repeat Actions Needed at Recently Addressed NPL Locations

To assess the degree repeat actions are still required, we reviewed the records for all completed removal actions at 42 NPL sites between February 1, 1984 and December 31, 1985. Table 2.4 reflects the number of repeat actions required.

Table 2.4: EPA Actions to Recent Hazardous Waste Sites February 1, 1984 to December 31, 1985

Number of NPL sites	42
Number of actions	49
Number of sites with repeats	5
Cost of repeats	$624,053

Three of the five sites requiring repeat actions had initial actions prior to February 1984 but had not previously been assessed because the sites did not meet our assessment criteria. For example, LaSalle Electric Utilities has had a total of three removal actions, but the site was categorized as an active site during our first review. The New Bedford and Chemical Control sites did not meet the previous assessment criteria because the Coast Guard rather than EPA performed the initial removal. Subsequent to February 1984, however, these sites required two removal actions by EPA. Therefore, only 2 of the 42 sites required both initial and repeat removal actions since February 1984.

The Highlands Acid Pit site required a repeat removal action to install additional fencing to further ensure site security. The Baird & McGuire site required two additional actions. In that instance, the more permanent remedial program's studies revealed the presence of dioxin in swampy areas east of the facility and south near the abandoned town well. Therefore, the first repeat was initiated to further analyze the site soil, sediment, and surface water. The subsequent removal action involved the demolition of two contaminated and weakly structured buildings and a tank farm, the installation of a temporary cap over the tank farm area, and rerouting a municipal water main.

Although the number of repeat actions at recently addressed priority sites appears to be less than that previously experienced, insufficient time (since the December 31, 1985, cutoff) may have elapsed to evaluate the actual effectiveness of EPA's cleanup activities. Repeated actions, on the average, generally occur approximately 9 months after the first action; therefore, it may be too soon to determine how many of these sites may require additional removal actions before the sites are permanently cleaned up.

While these 42 sites required relatively few repeat removals, the need for many more removal actions may be required on the 27 NPL ongoing actions as of December 31, 1985. Because the Superfund taxing authority lapsed on September 30, 1985, EPA began a slowdown in the number and depth of removal actions undertaken to conserve funds for

the more pressing actions potentially arising in fiscal year 1986. The impact of the lapse of the taxing authority is discussed in more detail in chapter 3.

Repeat Actions Are Costly

EPA has spent about $54 million for removal actions at the 114 priority sites through December 1985. About 40 percent of these funds ($22.6 million) was spent on repeat actions. Most of these repeat costs—98 percent—were incurred at sites initially addressed during the first 3 years of the program as shown on table 2.5.

Table 2.5: Costs of Repeat Removal Actions

Dollars in millions

Period	NPL sites	Costs		
		Initial actions	Repeat actions	Total
December 1980 - February 1984	72	$22.5	$22.0	$44.5
February 1984 - December 1985	42	8.6	.6	9.2
Total	**114**	**$31.1**	**$22.6**	**$53.7**
Percent		58	42	100

Repeat actions accounted for about 90 percent of the total funds spent at some sites. For example, we identified 10 sites where EPA performed four or more removal actions without totally mitigating the hazardous waste situation. While we could not determine how much additional moneys would have been required to more permanently contribute to site cleanup if EPA had expended the funds during the first removal action, we identified expenditures of at least $12.5 million associated with the numerous repeat actions identified as shown on table 2.6.

Table 2.6: Hazardous Waste Sites Requiring Four or More Removal Actions

Site	Total actions	Initial costs	Repeat costs	Total costs
Bridgeport Rental & Oil	6	$ 31,032	$ 1,730,854	$ 1,761,886
American Creosote Works, (FL)	6	16,959	763,895	780,854
Liquid Disposal	4	264,461	3,196,968	3,261,429
Envirochem	4	45,071	1,955,388	2,000,459
Geneva/Furhmann	4	71,963	1,913,935	1,985,898
Motco	5	335	484,897	485,232
Stringfellow Acid Pits	5	74,047	737,118	811,165
Keefe Environmental	4	715,068	1,332,482	2,047,550
York Oil	4	110,667	114,735	225,402
Olean Well Field	4	23,174	271,469	294,643
Total	**46**	**$1,152,777**	**$12,501,741**	**$13,654,518**
Percent		8.4	91.6	100

Because some first-time removal actions only temporarily contain or stabilize hazardous substances onsite, releases recur—increasing soil, surface water, and groundwater contamination. When hazardous substances are released, subsequent actions are not only required to stop the release but also to clean up any areas contaminated by the release to prevent further threats. The additional clean up results in higher cost actions.

In addition, mobilization and demobilization costs are incurred for every action at a site. Mobilization costs include bringing office and laboratory trailers onsite and connecting electricity, telephone lines, and other utilities. Equipment must also be brought onsite; for example, heavy equipment for drum removal and pumping equipment for draining lagoons. A site safety plan must be established and personnel and equipment decontamination zones must be set up. In addition, a community relations plan must be developed to outline the nature of community concern, the key site issues, and activities to be undertaken at the site. During demobilization, equipment must be decontaminated and removed and any property restored as necessary. For a typical $100,000 removal action, mobilization and demobilization costs can range from $20,000 to $30,000. For larger actions, these costs increase, although they do not then make up as large as a percentage of total costs.

Conclusion

EPA continues to take numerous and costly repeat actions at the nation's most hazardous waste sites, and these actions may unnecessarily deplete scarce funds that could be better used to address other as yet

untouched sites. Had more thorough cleanup actions been performed during EPA's first effort, many of these costly repeated actions potentially could have been avoided and funds could have been saved. While EPA's recent cleanup actions appear to be more thorough than in prior years, thus potentially requiring fewer repeat actions, enough time has not elapsed to determine the actual effectiveness of those actions nor how many of these sites will potentially require subsequent removal actions.

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Is EPA Performing More Thorough Cleanups at Hazardous Waste Sites?

Historically, EPA appeared to merely stabilize the immediate and significant threats at those NPL sites that generally would be more fully addressed during the longer term remedial action and provide more thorough clean ups at the non-NPL sites at which EPA does not envision it taking the longer term actions. Recently, however, EPA modified its operating procedures and, during the last 2 years, has begun to more thoroughly address those easily correctable surface hazards (such as drums or tanks) by generally removing the hazards offsite at priority sites while continuing to stabilize the more difficult yet potentially more threatening and more costly hazards such as lagoons.

Despite these program improvements, the lapse of the Superfund taxing authority has depleted federal funds necessary for cleanup actions at some of the nation's worst hazardous waste sites. Consequently, EPA has had to delay and streamline its cleanup activities at many waste sites containing hazardous substance releases or threatened releases. This may cause increased risk of exposure to the surrounding public and the environment and could also result in increased costs to clean up the spread of contamination and the need for possible repeat emergency actions.

Prior EPA Policies and Procedures Limited the Extent of Removal Action

Originally, according to the NCP, a removal action was appropriate at a hazardous waste site if the action would prevent or mitigate an immediate or significant risk of harm to the public or the environment. Threatening situations could arise from direct contact with acutely toxic substances, contaminated drinking water, and fire or explosion. The removal action was complete when the immediate or significant risk no longer existed or until reaching the limits of 6 months, or $1 million. The extent of the removal action, then, was limited to abatement of the immediate and significant risk that precipitated the action. According to the Director, Emergency Response Division, the statutory limitations of $1 million and 6 months may prevent some removal actions from providing more surface cleanup. He said that exemptions from these limitations can be obtained but can only be used as long as an emergency situation exists.

In 1982 EPA, when it published the NCP, recognized that the limits placed on removal actions may prevent EPA from fully abating the threat caused by a release of hazardous wastes. According to the plan, without such limitations, an inordinate share of the Superfund might be spent on completing removal actions at sites that pose less significant threats

than sites on the NPL. Using this rationale, EPA limited the scope of removal actions in the NCP.

The limiting criteria may be appropriate for removal actions at non-NPL sites where EPA's responsibility for cleaning up these sites ends with the completion of the removal action. Although EPA is responsible for the overall cleanup of NPL hazardous waste sites as well, the NCP removal restrictions, as implemented, limited the extent to which EPA could use removal actions to aid in the clean up of these higher priority sites.

Modifications to Operating Guidance Still Lack Specific Requirements for Surface Cleanup

Our February 1985 report stated that

"... to better ensure that Superfund resources are effectively used, we recommend that the Administrator, EPA, include in the revisions to the NCP a requirement that removal actions eliminate surface hazardous substances to the extent possible to reduce recurring threats, avoid repeated actions, minimize Superfund expenditures, and contribute to the permanent remedy of NPL hazardous waste sites."

The recent revision to the NCP does not specifically address the extent of surface clean up necessary at NPL sites because, according to EPA officials, EPA had begun the formal Federal Register process to revise the NCP prior to receiving our report. Therefore, EPA officials consider not specifically incorporating our recommendation in the revised NCP as a timing problem. Further, EPA officials believe that proposed legislative changes will require more thorough clean ups at priority sites. These legislative proposals are discussed later in this chapter.

The new NCP which became effective on February 18, 1986, continues to provide general guidance on the extent of clean up required. Originally, EPA could institute three types of removal actions—immediate removals, planned removals, and initial remedial measures—each with its own procedural requirements. Both the immediate and planned removals were generally limited to 6 months or $1 million, with the possibility of obtaining a waiver to the limitations in certain circumstances. Planned removals arose in less threatening situations and required the affected state to agree to fund 10 percent of the removal effort. The initial remedial measure, however, was similar to the types of removal actions undertaken, but did not include the time or cost limitations. Rather, to implement an initial remedial measure, the affected state would have to enter into a contract or cooperative agreement with EPA to participate in the overall cost of the action. The revised NCP combines all three types

of response actions and generally eliminates cost participation by the states.

The revised NCP amended the definition of "remove" and "removal" to include actions that may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize, or mitigate damage to the public health or welfare or the environment. Both the removal of highly contaminated soils from drainage or other areas and the removal of drums, barrels, tanks, or other bulk containers that contain or may contain hazardous substances or pollutants or contaminants are cited as generally appropriate actions to take in removal efforts, but no specific requirement is cited for the removal of these hazardous substances from either NPL or non-NPL sites.

EPA is also revising its "Superfund Removal Procedures" to incorporate the modifications to the NCP. The focus of that document is on the specific procedures that On-Scene-Coordinators and other Superfund personnel should follow to conduct and support removal responses to actual or threatened releases of hazardous substances, pollutants, or contaminants. The draft revision now permits the On-Scene-Coordinator to respond to threats without demonstrating that they are imminent and substantial.

EPA recently developed two additional guides relating to surface drum and tank sites and pits, ponds, and lagoons. These guides, while generally prepared for the remedial program, are also applicable to the removal program and provide detailed procedures for planning response efforts at these type locations.

Thoroughness of EPA's Removal Actions Varies

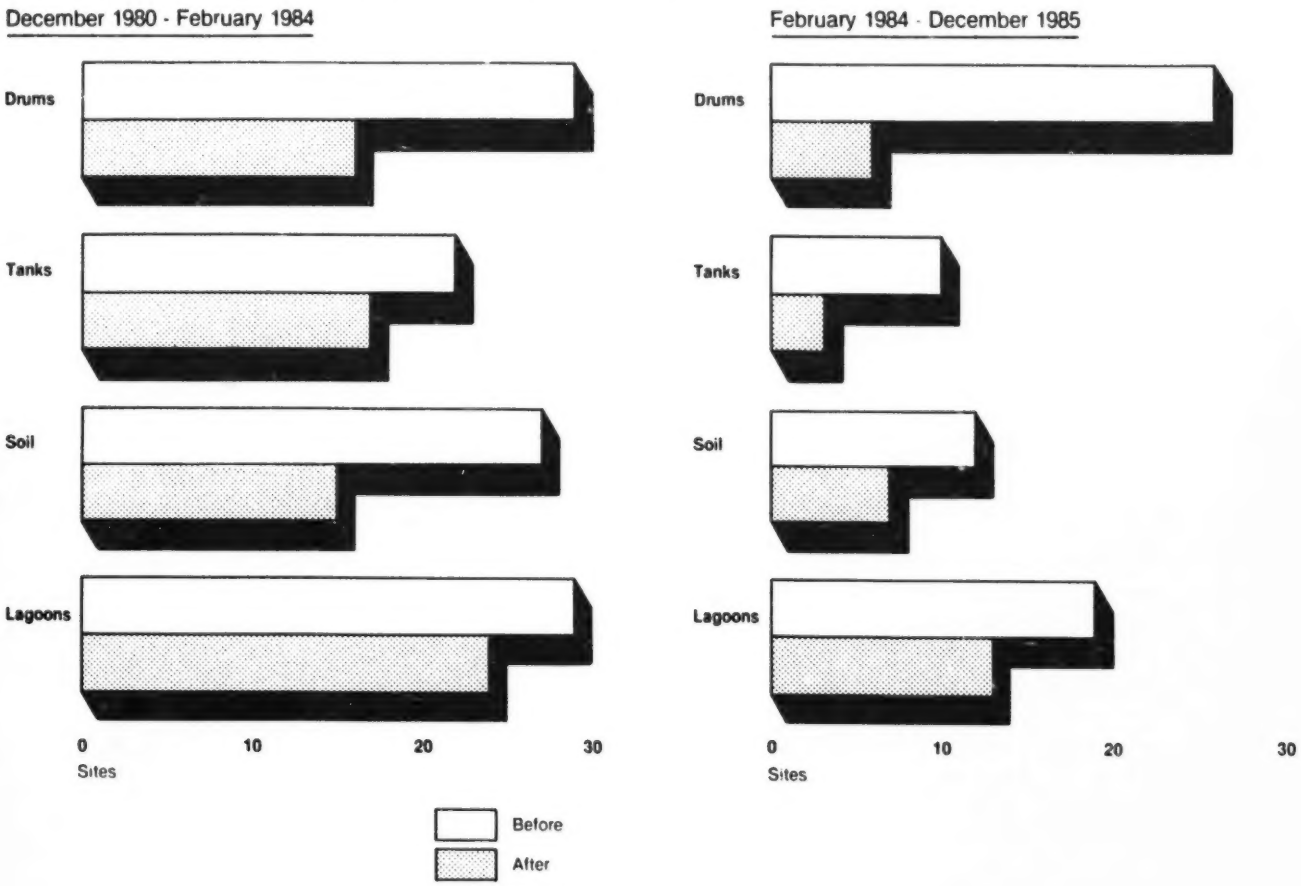
Hazardous waste sites vary significantly from the type and volume of hazard identified to the type of cleanup actions identified. Originally, EPA attempted to limit actions to those that would abate the immediate and significant risk that precipitated the action. While the abatement concept still arises, EPA has been performing more thorough removal actions at those sites involving drums and tanks while continuing to stabilize the more complicated hazards of soil and lagoon sites.

According to Emergency Response Division officials, EPA began to more thoroughly clean up priority sites in early 1984 because of changes in management philosophy coupled with headquarters delegation of

broader authority to the regions. Thus, EPA began to more liberally initiate removal actions, and the number and degree of cleanups increased. Additionally, EPA officials believe that the revised NCP will permit more extensive clean ups because the On-Scene-Coordinator will no longer have to be concerned with the hazard meeting the immediate and significant threat criteria.

Chart 3.1 compares the degree of hazards before and after removal actions for our two analyses of EPA's removal efforts.

Chart 3.1: Hazards Remaining at Site Before and After Removal Actions



Drums and Tanks More Readily Moved Offsite

Although hazardous waste sites generally included multiple hazards, completed removal actions during February 1, 1984 to December 31, 1985, involved 36 drum and tank sites of which EPA removed drums and tanks at 75 percent of the sites. When comparing these overall statistics with those in our previous report, EPA appears to be removing drums and tanks offsite more frequently. Between December 1980 and February 1984, EPA removed drums and tanks at 64 percent of the 51 sites. At the sites where drums and tanks remained after removal action, the responsible On-Scene-Coordinators indicated that either (1) the responsible party agreed to take over cleanup activities (at which time EPA closes the case from a removal standpoint), (2) the remedial action had been planned or had begun, or (3) EPA determined that the hazards did not pose a material threat. For example, at one site, during the remedial action, a removal action was performed to provide assistance in collecting, staging, and securing a cylinder rather than removing the cylinder offsite while the remedial staff analyzed the contents to determine a method of disposal. At another site, the remedial contractors inadvertently put uncontaminated mud and lightly contaminated work clothes in drums labeled "hazardous." The state, after identifying the hazardous drums, called EPA for an emergency response. EPA secured the drums and installed a fence because the drums did not pose a significant threat and the remedial staff was already onsite.

In an action involving a tank, the On-Scene-Coordinator indicated that the contents of the tank had been analyzed during the remedial investigation and determined not to pose a material threat. Therefore, the removal staff left the tank onsite because the remedial staff was in the process of developing the long-term cleanup strategy.

Lagoons and Soil Present a Special Problem

While drums and tanks were generally removed, lagoons and soil were not. EPA was removing these hazards at roughly the same percentage of sites during the two periods of our review—31 percent prior to February 1984 and 33 percent since then through December 1985.

These types of hazards present special problems. For example, many lagoons have sludge or hazardous materials at the bottom. Once the water is drained from the top of the lagoon, the bottom hazards are then exposed and must be treated. Depending on the size and depth of the lagoon and the type of hazardous substance at the bottom, EPA may apply different technologies for the permanent remedy. Thus, in most instances, EPA merely drains the lagoons down a foot or two to mitigate

the immediate threat of overflow. This action, however, usually provides only a temporary measure because after a period of time, rainfall once again raises the lagoon to potential overflow conditions.

According to EPA's On-Scene-Coordinators and Regional Project Managers, lagoons generally require extensive study to formulate the most cost-effective permanent remedy, and the sum of the hazards found at lagoons generally does not constitute an imminent and substantial threat that must be addressed in hours or days. The officials we spoke with indicated that the removal program aims at stabilizing the threat and the degree of action generally taken at lagoons far exceeds what would have been done under the removal program.

During our review, the revised NCP had not become effective as yet and, therefore, the more extensive initial remedial measure, now permitted under the removal program, was an unavailable alternative to the removal program unless the initial phases of the remedial action had been initiated. Because the revised regulations became effective on February 18, 1986, insufficient time has elapsed to determine whether EPA will take advantage of the expanded scope of the removal program to more fully address the hazards presented by lagoons and thus eliminate the costly repeated actions necessary in the past.

Lapse of Taxing Authority May Affect Cleanup Efforts

Although the House and the Senate agree that Superfund should be greatly increased because of the magnitude of the problem, delays in reauthorizing Superfund affected the continuity of program activities. While EPA attempted to minimize this impact, program activities have been curtailed and/or delayed, while short- and long-range plans have become increasingly obsolete resulting in disruptions to the normal workload. Further, because the duration for completing the delayed cleanup work will increase, the risk posed at these hazardous sites will be prolonged.

To retain resources from the fiscal year 1985 appropriations, EPA slowed or halted remedial work at 67 NPL sites in August 1985. Further, through April 1, 1986, EPA placed on hold about 91 (about 22 percent) of its planned fund-financed remedial investigation/feasibility work, 74 (about 83 percent) planned fund-financed remedial design efforts, and 31 (about 63 percent) planned fund-financed remedial construction projects.

To prioritize limited emergency response funds and to ensure that the removal program could address the worst emergencies, on October 2, 1985, the Assistant Administrator for Solid Waste and Emergency Response established a funding strategy that limited removal activities to only those sites meeting EPA's "true emergency" definition. EPA defined true emergency removal actions as those situations where response is required in a matter of hours or days resulting from actual threats to human life or health or the environment, such as fire or explosion threats, contaminated drinking water supplies, and direct contact with acutely toxic substances.

In March 1986 EPA identified 101 removal activities directly or indirectly affected by the delay in Superfund's reauthorization. Of these, 30 involved sites where EPA initiated but demobilized removal response actions due to funding shortages, 4 involved cases where EPA approved but did not implement removal actions due to funding shortages, and 67 involved removal actions that would have been processed for approval and action but were not due to funding shortages. In addition, 20 of the 101 affected actions would have taken place at NPL sites. Of these 20 actions, 6 would have potentially represented repeat actions, with 4 constituting the first repeat action at the particular NPL site.

EPA Emergency Response officials told us that these delays in removal actions have not resulted in any catastrophic impacts to the public or the environment, but instead have generally resulted in prolonged risk of hazardous exposures to the public and environment, less efficient cleanup work in instances where work was demobilized, and the possible need for a future repeat action. For example, at one NPL site funding constraints delayed the removal of staged and contained contaminated soil and asbestos. The On-Scene-Coordinator said that this delay has resulted in the continued risk of direct contact to the surrounding public at this unsecured site.

Regarding the demobilized removal actions, EPA requested that before demobilization responsible officials should consider the cost-effectiveness of the action. EPA officials, however, indicated that these actions will result in less efficient cleanup activities at these sites. Although officials could not attribute an estimated cost for demobilization because of the various factors involved and the uniqueness of each site, they agreed that both the demobilization and the subsequent remobilization will result in additional cost.

Conclusion

While EPA appears to have improved the extent some hazardous substances are cleaned up at NPL sites by generally performing offsite disposal of surface drums and tanks, hazards still remain at many sites involving lagoons. Previously, EPA believed that more thorough clean ups at lagoon sites exceeded the scope of the removal program; but with the revisions to the NCP, EPA can now more fully contribute to the permanent remedy by performing the initial remedial measure under the removal program.

Although EPA revised the NCP and other internal guidance, On-Scene-Coordinators still possess considerable latitude in determining the nature and extent of cleanup actions taken at the nation's hazardous waste sites. The revised NCP, while lacking specific guidance as to the degree of clean up that must be taken in given circumstances, now provides the option to more thoroughly address serious hazards by performing the initial remedial measure under the removal program. This option, if used often and consistently, may permit EPA to avoid repeat actions required because hazardous substances remain after the initial removal action.

The continuity of Superfund activities have been impeded by the lapse of taxing authority. Superfund cleanup activities have been delayed and curtailed due to the limited funding. While the overall impact of these shortcomings is difficult to quantify, it can best be described as disruptive to the continuity of Superfund activities and progress. Without the continuity of a fully funded program, planned and unplanned cleanup actions at hazardous waste sites cannot always be efficiently and completely performed.

Proposed Legislation Addresses Prior GAO Recommendation

Although the revised NCP permits a wider range of activities to be performed under the removal program, EPA did not specifically incorporate the recommendation of our February 1985 report where we suggested that EPA eliminate surface hazards to the extent possible to reduce recurring threats, avoid repeated actions, minimize Superfund expenditures, and contribute to the permanent remedy of priority hazardous waste sites.

While the Congress has not yet completed action on reauthorizing Superfund, the House and Senate Conference Committee has agreed with our recommendation. As of June 1986, the Conference Committee approved provisions containing language mandating that removal

actions contribute to the efficient performance of any long-term remedial action and increased the time and funding limitations from 6 months and $1 million to 1 year and $2 million. We believe that this legislative requirement if enacted, will accomplish the goal of more thorough surface clean up at priority sites. Therefore, we are not repeating our prior recommendation at this time in the belief that the proposed legislation, if enacted, will formally accomplish the same objectives.

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